GUJARAT TECHNOLOGICAL UNIVERSITY

ELECTRONICS & COMMUNICATION (SIGNAL PROCESSING & COMMUNICATION)
(41)
DIGITAL VIDEO PROCESSING
SUBJECT CODE: 2724112
SEMESTER: II

Types of Course: Advance level course

Prerequisites: Signals and Systems, Digital Image Processing

Rationale: The course aim to provide the knowledge beyond image processing. It deals with motions estimates and techniques for digital video processing. The deals with temporal and frequency domain techniques for video processing. It extends the concepts of image processing to video processing.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total
L	T	P	C	Theory Marks		Practical Marks				Marks
				ESE (E)	PA (M)	ESE (V)		PA (I)		
						ESE	OEP	PA	RP	
3	2#	0	4	70	30	30	0	10	10	150

Content:

Sr. No.	Content	Total Hrs	% weightage
1	Introduction: Analog Video and Digital Video, Standards, Three Dimensional Motion Models, Geometric Image Formation, Photometric Image Formation.	6	14
2	Spatial Temporal Sampling: Sampling for Analog and Digital Video, Rectangular Sampling and Periodic Sampling, Sampling and 3-D Structure, Reconstruction from Samples, Sampling Structure Conversion.	10	23
3	Motion Estimation and Segmentation: Optical Flow Methods, Block Based Methods, PEL –Recursive Methods, Bayesian Methods, Direct Methods for Segmentation	9	21
4	Motion Tracking: Motion and Structure from Stereo, 2-D Motion Tracking, 3-D Rigid Motion Tracking.	10	23
5	Video Filtering: Spatial Temporal Fourier Spectrum, Sub Nyquist Spatial Temporal Filtering, Filtering Along Motion Trajectories.	8	19

Reference Books:

1. Digital Video Processing, A. Murat Tekalp Pearson Education
2. Video Compression Peter D. Symes Tata Mc Graw Hill

Course Outcomes:

The first part of the course provides the basic format of analog and digital video and its format. The second part of the course may increase an awareness in area of video signal sampling and its reconstruction This course is specially design to increase student's interest area beyond signal & image processing. This course enhances student's knowledge in the field of video processing like video compressions, video estimation and segmentation, video motion detection and filtering. Student may able to extend their work in video watermarking & video analysis like shot boundary detection and key frame detection.

List of Tutorials:

1. Study of various techniques for video formation, Perception, and representation
2. Study of video sampling techniques and sampling rate conversion
3. Simulation study of video water marking algorithms
4. Simulation study of video compression standards and their comparison
5. Study of shot boundary detections methods and gradual shot boundary detections methods
6. Details report preparation of simulation of at least one video signal processing application.

Review Presentation (RP): The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website